

# Unintended Pregnancy and Postpartum Depression Among First-Time Mothers

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## Abstract

**Background:** Postpartum depression is a mental disorder that occurs after birth and has negative consequences for the mother, infant, and family. The objective of this secondary analysis was to examine whether pregnancy intention was associated with postpartum depression among first-time mothers.

**Methods:** The First Baby Study is a prospective cohort study of women aged 18–35 having a first singleton birth in Pennsylvania. Baseline data were collected during the third trimester. Postpartum depressive symptoms were measured at 1-month postpartum using the Edinburgh Postnatal Depression Scale. Logistic regression was performed to examine the association between unintended pregnancy and postpartum depression, controlling for prepregnancy anxiety/depression and sociodemographic data.

**Results:** Of 2972 first-time mothers, 83.4% were white, 70.7% were married, and 56.9% were college educated. Nine hundred fifty-two women (32.0%) reported their pregnancy was unintended and 151 (5.1%) met the threshold for postpartum depression. The prevalence of postpartum depression was higher in women with unintended pregnancies compared to women with intended pregnancies (6.7% vs. 4.3%,  $p < 0.01$ ). However, after controlling for confounders, unintended pregnancy was no longer associated with postpartum depression (adjusted OR 1.41; 95% CI 0.91–2.18). Variables independently associated with postpartum depression included prepregnancy anxiety/depression, Asian race, and Hispanic ethnicity.

**Conclusion:** Pregnancy intention was not independently associated with postpartum depression among first time mothers in Pennsylvania.

## Introduction

POSTPARTUM DEPRESSION DESCRIBES maternal depression occurring after birth, with symptoms typically occurring within the first month after delivery.<sup>1–3</sup> According to the Centers for Disease Control and Prevention, 10%–15% of mothers experience postpartum depression within the first year after giving birth.<sup>4</sup> Depressive symptoms during the postpartum period have serious implications for both the mother's and child's health. Women can experience intense irritability and anger, anxiety, feelings of guilt, and a sense of being unable to care for the baby.<sup>5</sup> Postpartum depression is also associated with disturbances in mother-infant bonding and the child's emotional and cognitive development.<sup>6–8</sup> Additionally, postpartum depression can have somatic manifestations such as headache, fatigue, decrease appetite, insomnia and lack of energy.<sup>9</sup> These symptoms can lead to

greater health care utilization, but postpartum depression still remains under-identified and undertreated.<sup>10–12</sup>

A previous history of depression is a known risk factor for postpartum depression,<sup>13–15</sup> as well as younger age, lower educational attainment, and lower socioeconomic status.<sup>16–18</sup> Several prenatal risk factors have also been identified, such as low levels of social support during pregnancy, depression or anxiety during pregnancy, and experiencing stressful life events during pregnancy.<sup>15</sup> However, it is less clear whether unintended pregnancy, which affects nearly half of all pregnancies in the United States,<sup>19</sup> increases the risk for postpartum depression. One could hypothesize that unintended pregnancy increases the likelihood of stress or anxiety during pregnancy, which in turn increases the likelihood for postpartum depression. Several international studies have demonstrated an increased risk for postpartum depression after an unintended pregnancy,<sup>18,20–22</sup> but there is scarce data on the

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relationship between unintended pregnancy and postpartum depression in U.S. samples. A study using Maryland Pregnancy Risk Assessment Monitoring System (PRAMS) data found that a self-reported diagnosis of postpartum depression is more likely among mothers with unwanted and mistimed births than among mothers with intended births; however, that analysis was limited by lack of objective criteria for postpartum depression and inability to consider an important potential confounder—prepregnancy depression.<sup>23</sup> Further research on the relationship between pregnancy intentions and postpartum depression in U.S. women could shed light on the clinical and psychosocial needs of women experiencing unintended pregnancies and contribute to policy discussions regarding family planning.

In the current study, we investigate whether pregnancy intention is associated with the prevalence of postpartum depression at 1 month after birth in first-time mothers, controlling for prepregnancy characteristics. We hypothesize that women with unintended pregnancies are at higher risk for postpartum depression.

## Methods

### Study design

Data for these secondary analyses are from the First Baby Study, which is a longitudinal cohort of women having a first, singleton birth. The purpose of the parent study is to investigate the relationship between mode of first delivery (vaginal vs. cesarean) and likelihood of subsequent childbearing. Participants were recruited between January 2009 and April 2011 from numerous locations, such as hospitals, obstetricians' offices and clinics, and targeted mailings to potentially eligible women obtained from marketing lists. Women were eligible to participate if they were residents of Pennsylvania, aged 18 to 35 at the time of the baseline interview, nulliparous, currently pregnant with a singleton pregnancy, and able to speak English or Spanish. Since the primary objective of the First Baby Study was to study subsequent childbearing, eligibility was limited to women 18–35 years of age, because that age group has the highest likelihood of subsequent childbearing within 3 years following initial birth. Details regarding recruitment are described elsewhere.<sup>24</sup> Participants of the First Baby Study completed the baseline telephone interview during the third trimester (at or after 34 weeks gestation), and were followed up with a subsequent telephone interview at 1-month postpartum. The First Baby Study was approved by the Institutional Review Board of the Penn State College of Medicine.

The current study aims to understand the association between pregnancy intention and postpartum depression, using data collected from the 3006 women who were recruited, consented, and completed both the baseline interview and 1-month postpartum interviews. Women who responded to the pregnancy intention question that they did not know ( $n = 30$ ) or had incomplete responses to the postpartum depression questions ( $n = 4$ ) were excluded, leaving an analytic sample of 2972.

### Definition of variables

**Pregnancy intention.** Pregnancy intention was determined at the baseline interview using standard measurement from the PRAMS:<sup>25</sup> "Thinking back to just before you got pregnant this time, how did you feel about becoming preg-

nant? Would you say you wanted to be pregnant sooner, you wanted to be pregnant later, you wanted to be pregnant then, or you didn't want to be pregnant then or at any time in the future?" Women were considered to have an intended pregnancy if they responded they wanted to be pregnant sooner or wanted to be pregnant then. Women were considered to have an unintended pregnancy if they wanted to be pregnant later or they did not want to be pregnant then or at any time in the future.

**Postpartum depression.** According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, 2000) criteria for postpartum depression, symptoms of postpartum depression must begin within four weeks of delivery.<sup>26</sup> Thus, the outcome variable of postpartum depression was assessed at the 1-month postpartum telephone interview. The Edinburgh Postnatal Depression Scale (EPDS) is a validated 10-item instrument to assess maternal depressive symptoms in the past 7 days, where a threshold score of 12 to 13 identified women with major depressive illness.<sup>27</sup> Postpartum depression was defined as an EPDS score of 12 or greater.<sup>28</sup>

**Covariates.** Covariates were chosen that could potentially confound the relationship between pregnancy intention and postpartum depression. By definition, pregnancy intention reflects whether pregnancy was intended just prior to conception. Thus, only variables that were present at the time of conception were chosen to be covariates. Women were asked, "Before this pregnancy, had a doctor or other health care professional told you that you had any of the following conditions?" If they answered "yes" to the item "anxiety or depression" they were defined as having prepregnancy anxiety/depression. Sociodemographic variables included age group (18–24, 25–29, or 30–36 years), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, Asian, or other), education (high school degree or less, some college or technical school, or college graduate or higher), marital status (married, living with partner, partnered but not living together, or not partnered), and poverty status (poverty, near poverty, or not poverty).

### Statistical analysis

Frequencies of the study variables were determined. Bivariate analyses were performed to test the association between the independent variables and postpartum depression using chi-square tests. We then used multivariable logistic regression to model the association between pregnancy intention and postpartum depression, controlling for covariates that were associated with postpartum depression in bivariate analyses ( $p < 0.2$ ). All analyses were performed using SAS Version 9.3 (SAS Institute, Inc.).

## Results

Table 1 shows the characteristics of the 2972 women in our study population. Most of the women were white, married, and had a college degree or higher. Almost one-third (32.0%) of the pregnancies were unintended. Prepregnancy anxiety/depression was reported by 22.8% of the participants (compared with 23.6% of Pennsylvania women reporting ever having depression in the 2011 Behavioral Risk Factor Surveillance Survey).<sup>29</sup>

TABLE 1. CHARACTERISTICS OF FIRST BABY STUDY PARTICIPANTS, STRATIFIED BY POSTPARTUM DEPRESSION (N=2972)

	Overall	Postpartum depression		p-value*
		Positive N=151 (5.1%)	Negative N=2,821 (94.9%)	
<b>Pregnancy intention</b>				<0.01
Intended	2020 (67.9)	87 (57.6)	1933 (68.5)	
Unintended	952 (32.0)	64 (42.3)	888 (31.4)	
<b>Age group</b>				0.02
18–24	764 (25.7)	50 (33.1)	714 (25.3)	
25–29	1177 (39.6)	44 (29.1)	1133 (40.1)	
30–36	1031 (34.6)	57 (37.7)	974 (34.5)	
<b>Race/ethnicity</b>				<0.01
White	2480 (83.4)	105 (69.5)	2375 (84.1)	
Black	216 (7.2)	19 (12.5)	197 (6.9)	
Hispanic	161 (5.4)	15 (9.9)	146 (5.1)	
Asian	62 (2.0)	10 (6.6)	52 (1.8)	
Other	53 (1.7)	2 (1.3)	51 (1.8)	
<b>Education</b>				0.67
HS degree or less	495 (16.6)	29 (19.2)	466 (16.5)	
Some college or technical	786 (26.4)	40 (26.4)	746 (26.4)	
College grad or higher	1691 (56.9)	82 (54.3)	1609 (57.0)	
<b>Marital status</b>				<0.01
Married	2102 (70.7)	88 (58.2)	2014 (71.4)	
Living with partner	535 (18.0)	32 (21.1)	503 (17.8)	
Not living with partner	179 (6.0)	15 (9.9)	164 (5.8)	
Not partnered	155 (5.2)	16 (10.6)	139 (4.9)	
<b>Poverty status</b>				<0.01
Poverty	243 (8.6)	21 (15.4)	222 (8.3)	
Near poverty	244 (8.7)	18 (13.2)	226 (8.4)	
No poverty	2315 (82.6)	97 (71.3)	2218 (83.2)	
<b>Prepregnancy depression or anxiety</b>				<0.01
Yes	678 (22.8)	72 (47.6)	606 (21.4)	
No	2294 (77.1)	79 (52.3)	2215 (78.5)	

\*Chi-square analyses comparing women with and without postpartum depression.

At 1-month postpartum, 151 (5.1%) of the women met the threshold for postpartum depression. In bivariate analysis, postpartum depression was more prevalent in women with unintended pregnancies compared to women with intended pregnancies (6.7% vs. 4.3%,  $p=0.005$ ). Other variables associated with postpartum depression in bivariate analysis included age group, Asian race, not being married, poverty, lower social support, higher psychosocial stress, smoking, and prepregnancy depression.

The results of the multivariable analysis are shown in Table 2. After controlling for the prespecified covariates, unintended pregnancy was no longer significantly associated with postpartum depression (adjusted OR 1.41; 95% CI 0.91–2.18). Prepregnancy depression was the strongest predictor of postpartum depression, with increased odds of four-fold. Asian race and Hispanic ethnicity were also independently associated with greater odds of postpartum depression.

## Discussion

Previous research studying the relationship between unintended pregnancy and postpartum depression has generally found a higher likelihood of postpartum depression among mothers with unintended and unwanted births.<sup>18,21,30</sup>

A significant limitation in the existing research, in both international and U.S. populations, is the inability to control for prepregnancy depression as a potential confounder. In this report from the First Baby Study, we found that the prevalence of postpartum anxiety/depression was higher among women with unintended pregnancies, but in contrast to previous literature, unintended pregnancy was not independently associated with postpartum depression. Our findings possibly differ from previous reports due to our unique ability to control for prepregnancy anxiety/depression.

Although unintended pregnancy was not independently associated with postpartum depression, it is important to note that postpartum depression was more likely among women with unintended pregnancies. This is likely due to the fact that characteristics that were associated with higher rates of unintended pregnancies (younger age, non-white race, non-married, prepregnancy anxiety/depression) were also associated with postpartum depression. Thus, while women with unintended pregnancies were more likely to be experiencing postpartum depression, it was not independent of these baseline characteristics.

Our multivariable analysis revealed several important independent predictors of postpartum depression—pregnancy anxiety/depression and race/ethnicity. Prepregnancy anxiety/

TABLE 2. LOGISTIC REGRESSION MODELING OF THE ASSOCIATION OF PREGNANCY INTENTION WITH POSTPARTUM DEPRESSION (N = 2798)

Characteristics	Adjusted odds ratio for postpartum depression	95% Confidence interval
<b>Pregnancy intention</b> (unintended vs. intended)	1.41	0.91–2.18
<b>Age group</b>		
18–24	Reference	Reference
25–29	1.07	0.61–1.88
30–36	1.73	0.96–3.09
<b>Race/ethnicity</b>		
White	Reference	Reference
Black	1.43	0.69–2.95
Hispanic	2.07	1.04–4.10
Asian	5.49	2.45–12.30
Other	0.81	0.19–3.52
<b>Marital status</b>		
Married	Reference	Reference
Living with partner	1.04	0.60–1.80
Not living with partner	1.82	0.85–3.91
Not partnered	1.62	0.77–3.43
<b>Poverty</b>		
Poverty	1.56	0.86–2.85
Near poverty	1.33	0.74–2.41
Not poverty	Reference	Reference
<b>Prepregnancy depression or anxiety</b> (yes vs. no)	4.02	2.78–5.82

depression is a well-described risk factor for postpartum depression,<sup>13–15</sup> so that finding was expected. While the role of race in the etiology of postpartum depression is not well described, one previous study does report higher prevalence of postpartum depression in African American women compared to other races.<sup>17</sup> In contrast, our study results suggest that postpartum depression is more likely in Hispanic and Asian women compared to white women, while no increased risk was observed among other races. The reasons for this are unclear. It is possible that Hispanic and Asian women are less likely to have pre-pregnancy depression identified and treated prior to pregnancy, which may result in higher rates of postpartum depression, however this needs to be further evaluated.

The main strength of this study is use of data from the First Baby Study, which provided a large sample size, longitudinal data, and rich survey data allowing several potential confounding variables to be controlled for. Another strength of this analysis was that all women in the First Baby Study were having their first, singleton birth, so there was no heterogeneity in reproductive life stage and number of previous children, which could certainly have varying effects on the relationship between unintended pregnancy and postpartum depression. Finally, our study used the EPDS to define postpartum depression, which has been widely used and validated both clinically and in research,<sup>9–10</sup> although does not equate to a clinical diagnosis.

Our study also has several limitations. The design of the First Baby Study was to conduct baseline interviews with

pregnant women at 34 weeks gestation or later. Thus, the sample did not include women with early preterm births. Women with significant pregnancy complications may be less likely to participate in a study of this kind. For these reasons, the vast majority of women participating in the First Baby Study had uncomplicated full-term births, which may explain the relatively low prevalence of postpartum depression in our sample. It is possible that the association between pregnancy intentions and postpartum depression may be different among women with preterm births or complicated pregnancies. Our study population was limited to women residing in Pennsylvania, who were 18–35 years old at the time of the baseline interview, mostly white, married, and highly educated, which may limit the generalizability of our findings to other populations. Lastly, pregnancy intention is meant to capture whether or not a woman intended to get pregnant in the time just prior to conception.<sup>23</sup> While retrospective reporting of pregnancy intention is standard research practice, ascertaining pregnancy intention in this manner is certainly subject to recall bias.<sup>31</sup>

## Conclusions

While postpartum depression was more common in women experiencing an unintended pregnancy, unintended pregnancy was not an independent risk factor for postpartum depression in the First Baby Study. Increased risk for postpartum depression was observed in women with pre-pregnancy depression, and Hispanic or Asian race. Although postpartum depression can lead to complications for both the mother and child, there are currently no evidence-based guidelines for universal postpartum depression screening, leaving practitioners uncertain about who should be screened for postpartum depression. Further research on pregnancy intentions and postpartum depression should include more socioeconomically and racially diverse samples of women and more representative samples of women in terms of pregnancy complications and early preterm births.

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## Disclosure Statement

No competing financial interests exist.

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